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ABSTRACT

A study investigated whether children reading an informational story recalled more information and perform better on a delayed test than those who read a textbook containing many of the same ideas. Subjects, 58 fifth-grade students from a suburban public school with approximately equal percentages of African-American and Caucasian children from a wide range of socioeconomic conditions, were randomly assigned to read either "The Magic Schoolbus inside the Earth" or a section of a chapter from a fourth-grade science textbook. Subjects wrote a recall immediately after reading the text, completed a short answer test one week later, and drew a diagram of the earth. Results indicated that: (1) recalls of the informational story were longer than those of the expository text; (2) good readers had longer recalls for both types of texts than poor readers; (3) good readers included more informational ideas in their recalls than poor readers; (4) scores on the short answer test did not differ by reader or type of text, and there was no interaction; (5) children in either condition recalled very few informational ideas from either text; and (6) 12 of the recalls had a narrative structure, 12 had an expository structure, and 4 had a mixed structure. Findings suggest that when not given a purpose for reading this type of text, middle grade children may take either an aesthetic or efferent stance. Future studies should focus on the unique contributions each type of text offers to elementary science instruction. (Contains 24 references.) (RS)

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Running Head: COMPARING A TEXTBOOK AND AN INFORMATIONAL STORYBOOK

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Recent theories of learning have moved away from a focus on only cognitive factors toward a consideration of affective factors such as interest (Pintrich, Marx & Boyle, 1993). Research on the effect of interest consistently shows that it plays an important role in learning (Krapp, Hidi, & Renninger, 1992). Interest has been categorized as individual interest which is a personal characteristic or disposition and situational interest which refers to characteristics of the environment that arouse general interest (Krapp, Hidi & Renninger, 1992).

Research on situational interest has focused particularly on interestingness of text and has demonstrated that interesting texts motivate people to read them and result in quantitively and qualitively superior learning (Krapp, Hidi & Renninger, 1992). This research has also provided evidence that narratives are more interesting than expository texts. Hidi, Baird & Hilyard (1982) identified three different types of informational texts used in fourth grade language arts and social science textbooks: those with a clearcut narrative structure, those with an expository structure and mixed texts, i.e. expository texts that contained embedded narrative elements. Adult raters asked to rate ideas as interesting in the different types of texts found 36.5% of the ideas in narratives interesting, 30.5% of the ideas in mixed texts interesting and only 2.5% of the ideas in the expository texts interesting. When Hidi and Baird (1983, 1986) analyzed fourth and sixth grade children's recalls of these texts, they found that any section of text containing traditional story elements with goal-directed activities and human interest factors was well recalled.

In the narrative texts in the Hidi, Baird and Hilyard (1982) study, the interesting ideas were also rated as important However, in the mixed texts, narrative elements were often vivid details related only slightly to the structurally important content information in the text. In this case, interestingness apparently interfered with learning of the structurally important ideas for the trivial details presented in narrative anecdotes were recalled while important content area ideas were not. This "seductive detail" effect has been found in several other studies (e.g. Garner et al., 1989; Wade & Adams, 1989).

As part of the move toward the use of tradebooks in science instruction, more informational stories (Leal, 1993) are being used for science instruction because it is assumed that they are more interesting than traditional textbooks. In informational stories,information is embedded in a story while in the mixed texts used in the research studies described above, stories were embedded in an expository structure. There is evidence that informational stories are interesting to children. Leal (1992,1993) found that reading informational stories generated more discussion by first, third and fifth grade students than reading either a narrative or an expository tradebook. Moreover, the discussion was of a higher quality. Students speculated and predicted more, made more extratextual connections to text and topic and made more comments combining information learned from their peers with prior knowledge (Leal, 1992).

There is also evidence that some informational stories can help children learn science concepts. Maria and Johnson (1990) compared learning of scientific information by fifth and seventh graders in an

informational story and an expository text. They found that subjects learned the scientific explanation of the cause of the seasons better with the informational story. However, in the informational story that they used, learning the scientific cause of the seasons was the main goal of the story. Thus it is likely that the important ideas were also interesting as in the narratives used in the Hidi, Baird and Hilyard (1982) study.

Because informational stories are mixed texts, however, it seems possible that readers may focus on the story ideas rather than the scientific information presented in the story. In a study by Jetton (1992), second grade children recalled more story ideas than informational ideas from an informational story even when they were told that the teacher would be reading them the story so that they could learn about whales. The informational story in this study was a blend of fantasy and scientific information.

The books in The Magic Schoolbus series (Cole, 1986, 1987, 1989, 1990, 1992) are also a blend of fantasy and science information. Ms. Frizzle takes the children in her class inside the human body, inside the earth, under the ocean etc. by means of a magic schoolbus. The stories contain a high activity level and much surprising and novel information. Since the characters in the stories are elementary school children and their teacher, children who read them can personally relate to the characters. The pictures support the high imagery nature of the story. All of these factors have been identified as elements that increase a text's interest (Anderson, Shirey, Wilson, & Fielding, 1987; Kintsch, 1980; Schank, 1979). It therefore is not surprising that these

stories are among the most popular informational stories recommended for use in science instruction (Shockley & Allen, 1990; Short & Armstrong, 1993). Because of these interesting aspects of the Magic Schoolbus books, it was hypothesized that children would recall more from one of these informational stories, The Magic Schoolbus Inside the Earth (Cole, 1987), than from a traditional textbook.

The Magic Schoolbus books have a unique format which also seems to be appealing to children. Many of the informational ideas are not presented in the main text, but in sidebar charts and speech balloons of characters. Like the child in the informational story used in the Jetton (1992)study, the children in these informational stories are often more interested in the fantastic things that are happening to them than in learning scientific information. Since many of the informational ideas presented in the The Magic Schoolbus Inside the Earth (Cole, 1987) are not central to the story, it seems possible that the interesting story might interfere with the learning of these ideas. The main question of the study, therefore, was "Will fifth grade children who read this informational story recall more informational ideas than those who read an textbook containing many of the same ideas? The second question was whether those reading the informational story would perform better on a short answer delayed test. A third question was whether narrative texts would be particularly helpful for poor readers, i.e. would there be an interaction between type of text and type of reader?

Other questions related only to those children who read the informational story. Would their recalls have a narrative, expository

or mixed structure? Would they contain more narrative or more informational ideas?

Method

Subjects

Subjects were 58 fifth-grade students from a suburban public school a wide range of SES levels and approximately equal percents of African American and Caucasian children.minority balance of .with a . 43% of the subjects were white. None of the children had received any formal instruction in Earth Science.

Subjects were categorized as good or poor readers on the basis of their total reading score on the Grade 4 Cognitive Test of Basic Skills (Fourth Edition, 1989) (Data was not available for 7 students.). Good readers (N=20) scored at or above the 65th percentile. Those scoring below the 65th percentile (N=31) were categorized as poor readers.

Materials

Subjects read xeroxed copies of either The Magic Schoolbus inside the Earth (Cole, 1987) or a section of a chapter from a fourth grade science textbook, Science Horizons (Mallinson et al., 1991). The Magic Schoolbus text was 33 pages long and had a fourth grade Raygor readability level. The 18 page section of the textbook also had a fourth grade Raygor readability level and a typical expository structure. Both texts contained information about the layers of the earth and the different types of rocks. There were pictures on every page of both texts, but in the Magic Schoolbus text, the pictures covered the entire page.

Both texts were analyzed by the first author into informational ideas explicitly stated in the text using Turner and Greene's (1977) system as a guide. Each clause and each attribute of a concept was considered a separate concept. The second author and another graduate assistant also analyzed the text. We then reanalyzed the text together to determine that there were 250 informational ideas in both texts with 41 ideas common to both. The Magic Schoolbus text was also independently analyzed by two raters for narrative ideas. It was determined that there were 160 narrative ideas. Although our goal was to categorize ideas as either narrative or informational, 8 informational ideas were also characterized as narrative ideas since they seemed so central to the story.

An analysis of the labeled pictures in the textbook indicated that with one exception the pictures repeated ideas found in the text. Informational ideas and narrative ideas in the Magic Schoolbus text were color coded according to the format in which they occurred. 20 informational ideas (8%) were contained only in the main text, 112 (45%) were contained only in the inserted charts, 16 (2%) were contained only in a speech balloon statement by Ms. Frizzle, 14 (6%) were contained only in a speech balloon statement by one of the children and 57 (23%) were contained only in labeled pictures. The remaining ideas were repeated in more than one format. However only 5 repeated ideas were found in the main text. Thus the majority of informational ideas in the Magic Schoolbus text were not contained in the main text but in the inserted charts or pictures. The majority of narrative ideas (108, 68%) were contained in the main text. The remaining narrative ideas were

found in speech balloon statements by the children (45, 28%) or Ms. Frizzle (7, 4%).

Design and Procedure

The study had a 2(type of text) by 2 (type of reader) design. Within each of the fifth grade classes, children were randomly assigned to read either the informational story or the expository text. We told the children that we had given them different types of texts because we were interested in finding out what children remembered when they read different types of books. Immediately after reading their text, children wrote a recall. One week later the children completed a short answer test containing 14 items related to ideas found in both texts. In addition to multiple choice items related to the classification of rocks and the environment inside the earth, children were asked to draw a diagram of the earth labeling the layers of the earth. This test was used in a pilot study with another group of fifth graders several months prior to the main study. The wording and format of the questions were revised in light of problems encountered in the pilot study.

Results and Discussion

Using a t test, Total Reading NCE scores on the Fourth Grade Level of The Cognitive Test of Basic Skills were compared for the group reading the expository text (M=59.75, SD=14.19) and the informational story (M= 58.37, SD=19.55). The two groups did not differ in reading ability (t=.29; p=.77).

Recalls were independently scored for number of words and for number of informational ideas that were stated explicitly in the text or could be inferred. Recalls were independently scored for number of

words and for number of informational ideas that were stated explicitly in the text or could be inferred by connecting explicit statements. Differences were resolved by discussion. Number of words in the recalls, number of informational ideas and scores on the delayed short answer post test were then compared using a two-way ANOVA.

Number of words in recalls differed by reader (F=7.99, p=.007) and type of text (F=9.05, p=.005), but there was no interaction (F=3.51, p=.07). Good readers had longer written recalls in both types of texts (Expository Text: M=68.33, SD=26.68; Informational Story: M=117.27, SD=49.37) than poor readers (Expository Text: M=53.42, SD=16.80 Informational Story: M=76.06, SD=31.24). As can be seen from these means, recalls of the informational story were longer than those of the expository text. Thus our first hypothesis was supported, and our results also provide further support for Leal's (1992) findings. Children are apparently willing to write more about informational stories just as they are willing to discuss them more.

The number of informational ideas in the recalls differed by reader (F=29.87, p<.001) with good readers including more informational ideas in their recalls (Expository Text: M=9.33, SD=4.90; Informational Story: M=12.00, SD=5.25) than poor readers did (Expository Text: M=5.86, SD=2.63; Informational Story: M=3.00, SD=2.37). However, there was no difference for type of text (F=.03, p=.87) and there was no interaction (F=3.05, p=.09). Scores on the delayed short answer post test did not differ by reader (F=2.79, p=.10) or type of text (F.16, p=.70) and there was no interaction (F=.75, p=.39). Means and Standard Deviations for the good readers were M=8.25, SD=3.41 for the Expository Text and M=7.70

SD=2.58 for the Informational Story and for the poor readers M=5.58, SD=2.57 for the Expository Text and M=6.86, SD=3.03 for the Informational Story. There were no clear trends. For each group of readers, there was a different pattern for the two measures. Children in both conditions recalled very few informational ideas from either text. The maximum amount of ideas recalled was 20 out of 250 possible ideas (M=7.48, SD=5.41). Within this narrow range, there was great variation in the number of ideas recalled. Since the children were not given a pretest, we cannot be sure that they did not already know these ideas. Future studies should include a pretest and a more sensitive and authentic measure of science information.

Variation was also found in the structure of children's recalls of the informational stories (N=28) These recalls were independently and holistically scored by two raters as having a narrative, expository or mixed structure. There was agreement in the scoring of 25 of the 28 recalls, and the 3 disagreements were resolved by discussion. There were 12 recalls with a narrative structure and 12 with an expository structure. Only 4 recalls had a mixed structure. Recalls were then independently scored for number of narrative ideas, and number of narrative and informational ideas were compared using a dependent t-test. The means of the informational ideas (M=6.43, SD=5.87) and the narrative ideas (M=6.82, SD=7.85) did not differ (t= -.18, p=.86) because children who used a narrative structure tended to include mostly narrative ideas while those who used an expository structure included very few narrative ideas. In fact, 10 of the 12 recalls with an expository structure had no narrative ideas.

In this study, the children were deliberately not given a purpose for reading the texts in order to determine whether they would view the informational story as a story or as a source of information. Parents and teachers who make these books available to children may assume that they will read them for the science information that they contain. The results of this study suggest that when not given a purpose for reading this type of text, middle grade children may take either an aesthetic or efferent stance (Rosenblatt, 1991). As Short and Armstrong (1993) point out, this can be an asset because it helps children to integrate science and the language arts. However, teachers who are using informational stories for science instruction may need to set clear purposes for reading. We plan to undertake a study to determine how prevalent the use of informational stories is in science instruction and the ways in which teachers use them. Future studies are also planned to explore the processes and strategies children use to read and understand these texts in which information is presented in many different formats. In the present study, the two most frequently recalled informational ideas from the informational story were ideas that were repeated in the main text, the charts, the labeled pictures and the speech balloons.

Although the expository texts were apparently less interesting to the children, they did not learn less information from these texts. Children do need to learn to understand expository text, so it would be a big mistake to limit elementary children's exposure to this type of text. Future studies should focus on the unique contributions each type of text offers to elementary science instruction.

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